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being competent in the Japanese and English language, certify that to the best of my knowledge and belief the attached English translation is a true and faithful translation made by me of Japanese Patent Application No. 11-020345 filed on January 28, 1999.

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【List of Exhibits】

【Document】	Specification	1 copy
【Document】	Drawing	1 copy
【Document】	Abstract	1 copy

【Proof】 Need

【Name of Document】 SPECIFICATION

【Title of the Invention】 RECORDING MEDIUM AND RECORDING AND REPRODUCING APPARATUS

【What is Claimed is】

【Claim 1】 A recording medium capable of recording at least recording information by a recording and reproducing apparatus, comprising:

a first recording area for recording said recording information as a set of one or two or more predetermined recording units, and a second recording area for recording control information for controlling said recording information to be recorded in the first recording area;

characterized in that identifying information for identifying a management condition of the recording information to be recorded in said first recording area by said recording units is recorded in said second recording area.

【Claim 2】 A recording medium according to claim 1, characterized in that said identifying information further comprises identifying information for identifying the management condition of the recording information to be recorded in said first recording area as a plurality of sets, each of the set further comprising sets of said one or two or more predetermined recording units.

【Claim 3】 A recording medium according to claim 1 or claim 2, characterized in that said identifying information comprises at least a first identifying information for providing editing each of said recording units, a second identifying information for providing preservation of each of said recording units, a third identifying information for providing a logical erased condition for each of said recording units, and a fourth identifying information for providing physical erasure of each of said recording units.

【Claim 4】 A recording medium according to claim 3,

characterized in that:

said first identifying information and said second identifying information comprise mutually changeable identifying information,

said first identifying information and said third identifying information allows changing from the first identifying information to the third identifying information as well as, under a predetermined condition, from the third identifying information to the first identifying information, and

the fourth identifying information comprises identifying information which allows changing only from said first identifying information and said third identifying information.

【Claim 5】 A recording and reproducing apparatus for recording information of recording in a recording medium comprising a first recording area for recording the recording information as a set of one or two or more predetermined recording units and a second recording area for recording controlling information for controlling said recording information to be recorded in said first recording area,

characterized by provided with controlling means for recording identifying information for identifying a management condition of the recording information to be recorded in said first recording area by said recording units in said second recording area.

【Claim 6】 A recording and reproducing apparatus according to claim 5, characterized in that said controlling means provides information of the management condition by each of said recording units by reproducing identifying information recorded in said second recording area.

【Claim 7】 A recording and reproducing apparatus according to claim 5 or claim 6, characterized in that the

identifying information to be recorded by said controlling means by said recording units comprises a first identifying information for providing editing by each of said recording units, a second identifying information for proving preservation by each of said recording units, a third identifying information for providing a logical erased condition by each of said recording units, and a fourth identifying information for providing physical erasure by each of said recording units.

【Claim 8】 A recording and reproducing apparatus according to claim 7, characterized in that:

said first identifying information and said second identifying information comprise mutually changeable identifying information,

said first identifying information and said third identifying information comprise identifying information which allow changing from said first identifying information to said third identifying information, as well as, under a predetermined condition, from the third identifying information to the first identifying information,

said fourth identifying information comprises identifying information which allows only changing from said first identifying information and said third identifying information.

【Detailed Description of the Invention】

【0001】

【Technical Field of the Invention】

The present invention relates to a recording medium such as DVD-RW and the like capable of recording information of recording, and a recording and reproducing apparatus using the recording medium, and more particularly to a recording medium having a logical data structure for erasure, protection, and the like of the recording information already recorded, and a

recording and reproducing apparatus using the recording medium.

【0002】

【Related Art】

Conventionally, as a recording medium capable of recording and erasing recording information, a cartridge type floppy disc (FD), audio cartridge tape, video cartridge tape, or the like is known.

【0003】

The cartridge type floppy disc (FD) is provided with a movable lug for setting at an end of a cartridge case of either record unable (Write Protect) or record enable (Write Enable). When the movable lug is set at a record unable position by a user, recording (writing) of new recording information by a recording and reproducing apparatus is inhibited, thereby recording information already recorded can be protected. Further, if the movable lug is set at a record enable position, recording information already recorded is initialized, or new recording information can be overwritten for recording, thereby the recording information already recorded can be erased.

【0004】 The audio cartridge tape and video cartridge tape are respectively provided with a projected piece at an end of the cartridge case, and when the projected piece is removed by the user, overwriting of new recording information on the recording information already recorded is inhibited, thereby the recording information already recorded can be protected. On the other hand, if the projected piece is remained, by overwriting the new information, the recording information already recorded can be erased.

【0005】

【Problems that the Present Invention is to Solve】

Meanwhile, a DVD-Video using an optical technique is developed as a reproduction-exclusive recording medium which is capable of providing higher quality audio information, video

information, and the like, in comparison with the above-described recording medium, and in more recent years, a DVD-RW is remarked, the DVD-RW being capable of recording and reproducing a large capacity of recording information as well as capable of erasing and rewriting while maintaining physical compatibility among so-called DVD family including the DVD-Video.

【0006】

The DVD-RW is, from the nature thereof, a recording medium which enables users to produce more varieties of titles and more versatile editing in comparison with the above-described floppy disk (FD), audio cartridge tape, video cartridge tape, or the like. Therefore, instead of simply setting protection or erasure of recording information by use of a mechanical means provided on the above-described floppy disk (FD) or the like, protection or erasure of the recording information is made possible by a software process, and furthermore, a DVD-RW provided with a logical data structure capable of editing a variety of titles by effective utilization by users of the characteristic thereof while maintaining physical compatibility among the so-called VDV family has long been desired to be developed.

【0007】

The present invention is achieved in view of such problems, and an object thereof is to provide a recording medium provided with a logical data structure capable of protecting or erasing recording information by a software process as well as capable of editing a variety of titles, and a recording and reproducing apparatus using the recording medium.

【0008】

【Means for Solving the Problems】

For realizing the above-described object, the present invention provides a recording medium, capable of recording at

least the recording information by a recording and reproducing apparatus, comprising a first recording area for recording the above-described recording information as a set of one or two or more predetermined recording units, and a second recording area for recording controlling information for controlling the above-described recording information to be recorded in the first recording area, and having a construction where identifying information for identifying a management condition of the recording information to be recorded in the above-described first recording area by the above-described recording units is recorded in the above-described second recording area.

【0009】

According to such construction, by making the identifying information as identifying information for erasure, protection, or the like, and by allocating such identifying information to each of the predetermined recording units for management, the recording information can be edited and managed in a variety of modes.

【0010】

Further, a recording apparatus for recording information of recording on a recording medium comprising a first recording area for recording the recording information as a set of one or two or more predetermined recording units, and a second recording area for recording controlling information for controlling the above-described recording information to be recorded in the above-described first recording area, further comprises a controlling means for recording identifying information for identifying a management condition of the recording information to be recorded in the above-described first recording area by the above-described recording units in the above described second recording area.

【0011】

According to such construction, by making the identifying

information as identifying information for erasure, protection, or the like, and by allocating the identifying information to each of predetermined recording units for management, the recording information can be edited or managed in a variety of modes.

【0012】

By making the identifying information as identifying information for erasure, protection, or the like, and by allocating the identifying information to each of the predetermined recording units for management, the recording information can be edited or managed in a variety of modes.

【0013】

【Embodiments】

Embodiments of the present invention are described with reference to the drawings. Fig. 1 is a block diagram showing construction of a recording and reproducing apparatus using a DVD-RW (DVD-ReWritable) capable of reproducing and erasing of recording, and re-recording.

【0014】 In Fig. 1, the present recording and reproducing apparatus 1 comprises a spindle motor 3 for driving to rotate a DVD-RW2 which is a recording medium, pickup 4 for optically recording and reproducing recording information relative to the DVD-RW2, servo circuit 5 for servo controlling the spindle motor 3 and pickup 4, recording system 6 for generating data to be recorded in the DVD-RW2, reproducing system 7 for reproducing data recorded in the DVD-RW2, central control circuit 8 for controlling the entirety of the recording and reproducing apparatus 1, operating section 9 by which an operator issues a desired instruction to the central control circuit 8, and display 10.

【0015】

The recording system 6 comprises A/D converters 11, and 12, an audio compress circuit 13, video compress circuit 14,

multiplexer 15, recording buffer memory 16, encoder 17, and recording circuit 18.

【0016】

The A/D converter 11 analog-to-digital converts an externally supplied analog audio signal S_{A1} to a digital audio data D_{A1}, which is then outputted.

【0017】

The audio compress circuit 13 compresses the audio data D_{A1} based on a data compression system designated by a control signal C1 from the central control circuit 8, and the compressed data of the audio data (hereinafter referred to as compressed audio data) DP_{A1} is supplied to the multiplexer 15. It should be noted that, in the present embodiment, the data compression systems in accordance with respective AC-3 and MPEG audio data standards are applied, and these data compression systems can be arbitrarily designated by the user by operating the operating section 9.

【0018】

The A/D converter 12 analog-to-digital converts an externally supplied analog video signal S_{V1} to a digital video data D_{V1}, which is then outputted. The video compress circuit 14 compresses data of the video data D_{V1} in accordance with the MPEG2 video format (ISO 13818-2), and the compressed data of the video data (hereinafter referred to as compressed video data) DP_{VI} is supplied to the multiplexer 15.

【0019】

When the user instructs to commence recording, the multiplexer 15 multiplexes (time-division multiplex) the compressed audio data DP_{A1} and the compressed video data DP_{V1} in accordance with a predetermined timing designated by a control signal C2 from the central control circuit 8, and produces a time-division multiplexed compressed data DP_W which is presentation data.

【0020】

The recording buffer memory 16 temporarily stores the compressed audio data DP_{A1} and the compressed video data DP_{V1} and, in cooperation with the multiplexer 15, produces the compressed data DP_W. Then, compressed data DP_W which is time-division multiplexed is outputted to the encoder 17. Further, a data quantity signal Cmw representing a data quantity (data length) of the compressed data DP_W is transferred one by one from the recording buffer memory 16 to the central control circuit 8, and further, based on the data quantity signal Cmw, the central control circuit 8 makes the display 10 display the data quantity of the compressed data DP_W by a character, figure, or the like.

【0021】

The encoder 17 encodes the compressed data DP_W in accordance with a control signal C3 supplied from the central control circuit 8, thereby producing an encoded data D_{WE} which is then outputted to the recording circuit 18.

【0022】

Although detail is described hereunder, the encoder 17 also produces a navigation data necessary for controlling reproduction, which is then outputted. In particular, as one of the navigation data, a data (hereinafter referred to as identifier) FLG for managing the recording information in a video object (VOB) unit or in a title unit is produced.

【0023】

The recording circuit 18 performs a process of power-amplification or the like relative to the encoded data (including navigation data) D_{WE} in accordance with a control signal C4 supplied from the central control circuit 8, thereby producing recording data D_{WT} which is then supplied to the pickup 4.

【0024】

A light source such as a semiconductor laser or the like contained in the pickup 4 is driven by the recording data D_{WT} and further, by recording light emitted from the light source, the recording data D_{WT} is optically recorded in the DVD-RW2.

【0025】

Then, the reproducing system 7 comprises D/A converters 19 and 20, video decompress circuit 21, audio decompress circuit 22, demultiplexer 23, reproducing buffer memory 24, decoder 25, and reproducing circuit 26.

【0026】

The reproducing circuit 26 shapes waveform of a detected signal (RF signal) D_{RD} read out from the DVD-RW2 by the pickup 4 in accordance with a control signal C5 supplied from the central control circuit 8, thereby producing a binary reproducing data D_{PP} which is then outputted to the decoder 25.

【0027】

The decoder 25 decodes (restores) the reproducing data D_{PP} based on a predetermined decoding system corresponding to the encoding system of the above-described encoder 17 in accordance with a control signal C6 supplied from the central control circuit 8, thereby producing a decode date DP_R, which is then outputted to the reproducing buffer memory 24.

【0028】

The reproducing buffer memory 24 inputs the decoded data DP_R for temporarily storing therein, as well as supplies the navigation data Cmr contained in the decoded date DP_R to the central control circuit 8. Further, the reproducing buffer memory 24 aligns the temporarily stored decoded data DP_R in a decoded data DP_{AV} synchronized with a predetermined timing, and outputs to the demultiplexer 23.

【0029】

The demultiplexer 23 demultiplexes a compressed video data DP_{VO} and compressed audio data DP_{AO} which are time-division

multiplexed in the decoded data DP_{AV} in accordance with a control signal C7 supplied from the central control circuit 8, and supplies the compressed video data DP_{VO} to the video decompress circuit 21, and the compressed audio data DP_{AO} to the audio decompress circuit 22, respectively.

【0030】

By the video decompress circuit 21, the compressed video data DP_{VO} is performed of a predetermined decompressing process corresponding to the compression system of the above-described video compress circuit 14, and a decompressed video data D_{VO} is outputted. The D/A converter 19 digital-to-analog converts the video data DP_{VO} supplied from the video decompress circuit 21, thus producing an analog video signal S_{VO}, which is then outputted.

【0031】

By the audio decompress circuit 22, the compressed audio data DP_{AO} is performed of a predetermined decompressing process corresponding to the compression system of the above-described audio compress circuit 13, thereby producing a decompressed audio data D_{AO}, which is then outputted. The D/A converter 20 digital-to-analog converts the audio data D_{AO} supplied from the audio decompress circuit 22 to produce an analog audio signal S_{AO}, which is then outputted.

【0032】

The central control circuit 8 is constructed by comprising a memory 8a for recording a previously set system program or the like and a microprocessor (CPU) for controlling, by performing the above-described system program, operation of the entirety of the recording and reproducing apparatus 1.

【0033】

In other words, the central control circuit 8 controls by the above-described microprocessor operations of the servo circuit 5, the recording system 6, and the reproducing system

7, as well as receives an instruction from the user through the operating section 9, and makes the display 10 display present operation content of the present recording and reproducing apparatus 1, a variety of information associated with the recording information or reproducing information, menu display for presenting to the operator a manipulation method of the recording and reproducing apparatus 1, or the like.

【0034】

Further, the central control circuit 8 identifies a management condition of the recording information already recorded, based on an identifier FLG contained in the navigation data Cmr, and controls, when the user operates the operating section 9 and properly instruct change of the identifier FLG in the video object (VOB) unit or the title unit, for changing an identifier FLG of a pertinent video object (VOB) or title.

【0035】

Now, a logical data structure of the DVD-RW2 is described with reference to Figs. 2 through 6. It should be noted that the DVD-RW2 maintains a physical compatibility with the DVD-Video, as well as has a logical data structure which is common with the DVD-Video. Here, the features of the DVD-RW2 are mainly described.

【0036】

Fig. 2 is an explanatory diagram schematically showing entirety of a logical data structure. In Fig. 2, volume space of the DVD-RW2 comprises a lead-in area LI allocated to a track on the internal peripheral side of the DVD-RW2, a lead-out area LO allocated to a track on the external peripheral side thereof, and a data recording area (data recording zone) DZ.

【0037】

The data recording area DZ comprises a UDF (Universal Disc Format) recording area 27 where a micro UDF which is a logical format indicating a relationship between a physical address and

a logical address is recorded, and a video data recording area VDZ.

【0038】

Further, the video data recording area VDZ comprises a video manager (VMG) recording area 28 for recording control data called a video manager having video manager information (VMGI), and a video data recording area VDZ for recording video data, audio data, and the like, which are data for recording and reproducing. It should be noted that the video data recording area VDZ has data recorded thereon as a plurality of files 30, which are hierarchically structured as sets of a set unit, cell unit, module unit, pack unit, and the like.

【0039】

A video title set (VTS) 31 is determined to be the highest order recording unit, and can record a plurality of the video title sets VTS #1 through VTS #n. Each of the video title sets VTS comprises respective video object sets (VOBS) 32 corresponded one to one.

【0040】

Each of the video object sets (VOBS) 32 comprises a set of one or two or more video objects (VOB) 33. For reference, each of the video objects (VOB) 33 is attached of an ID number (V_ID1 to V_IDi), enabling to be identified.

【0041】

Each of the video objects (VOB) 33 comprises a set of one or two or more cells (Cell) 34, and each of the cells 34 comprises a set of one or two or more video object units (VOBU) 35. For reference, each of these cells 34 are also attached of an ID number (C_ID1 to C_IDj), enabling to be identified.

【0042】

Further, video data is made as a video pack V, audio data is made as an audio pack A, character information such as karaoke or the like is made as a sub-picture pack S, and a set of one

or two or more video packs V, audio packs A, and sub-picture packs S is made as a video object unit (VOBU) 35.

【0043】

In other words, presentation data having one or two or more video packs V, audio packs A, and sub-picture packs S is hierarchically structured by the video object units (VOBU) 35 and cells 34, video objects (VOB) 33, video object sets (VOBS) 32 and video title sets (VTS) 31 and, at the time of reproduction, is reproduced in accordance with program chain information (PGCI) in the video manager information (VMGI).

【0044】

The video pack V records video data following a pack header and packet header as shown in Fig. 3. The audio data A records each of the audio data in data construction in accordance with the differences in the data compression systems, as shown in Figs. 4(a) to 4(c).

【0045】

In the video manager recording area 28, as shown in Fig. 5, video manager information (VMGI) comprising at least program chain information (PGCI) and video object information (VOBI) is recorded.

【0046】

The video object information (VOBI) is information relative to an attribute of each of the video objects (VOB), and is provided with an attribute table or the like indicating respective attributes of the video pack V, audio pack A, and sub-picture pack S which are included in the video object (VOB).

【0047】

The program chain information (PGCI) is constructed by comprising a video object identifier table (VOBT) and a user title identifier table (UST), in addition to information indicating a reproducing order of the presentation data allocated to the video title set VTS (#1) to VTS (#n) and the

video object VOB (#1) to VOB (#n) in the order of the cells.

【0048】

As shown in Fig. 6, the video object identifier table (VOBT) is a table for batch management of respective identifiers FLG attached to individual video objects (VOB), and the user title identifier table (UST) is a table for batch management of respective identifiers FLG attached to individual titles formed by the user.

【0049】

In other words, each of the video objects (VOB) is corresponded with one each of the identifiers FLG, so as to indicate how each of the video objects (VOB) is edited is by each of the intrinsic identifiers FLG.

【0050】

Further, one each of the identifiers FLG is corresponded with each of the titles, so as to indicate how each of the titles is edited by each of the intrinsic identifiers FLG. Furthermore, as a title (#3) in Fig. 6, a title composed of a plurality of titles (#1), (#2), and the like is attached with an identifier FLG.

【0051】

Now, types of the identifier FLG are described. There are provided four types of the identifier; editable identifier NFLG, protective identifier PFLG, pseudo erasable identifier TEFLG, and completely erasable identifier CEFLG. These identifiers comprise, as schematically shown in Fig. 7, identifiers having reversibility permitting mutual change, and identifiers having non-reversibility permitting change only in one direction.

【0052】

The editable identifier NFLG is an identifier indicating possibility of editing in a variety of modes in the video project (VOB) or title unit. For example, a newly recorded video

project (VOB) or title is attached with the editable identifier NFLG as in the default state. Further, the user can attach the editable identifiers NFLG to desired video objects (VOB) or titles, thus enabling them editable.

【0053】

The protective identifier PFLG is an identifier for attaching in a case when a desired video object (VOB) or title is to be preserved without being erased, and the recording and reproducing apparatus or the like is inhibited to erase the video object (VOB) or title having this protective identifier PFLG attached thereto. Further, the protective identifier PFLG also inhibits editing of the pertinent video object (VOB) or title. Furthermore, the protective identifier PFLG has reversibility with the editable identifier NFLG, and the user can arbitrarily change from the protective identifier PFLG to the editable identifier NFLG, and from the editable identifier NFLG to the protective identifier PFLG.

【0054】

The pseudo erasable identifier TEFLG is an identifier to be attached for erasing a desired video object (VOB) or title, and by changing the editable identifier NFLG to the pseudo erasable identifier, a pertinent video object (VOB) or title can be erased.

【0055】

It should be noted that the pseudo erasable identifier TEFLG does not physically erase the pertinent video object (VOB) or title, but is for setting a seemingly erased state. Accordingly, the video object (VOB) or title having the pseudo erasable identifier TEFLG attached thereto is held in the DVD-RW2 as it is in the recorded state. However, the reversibility between the pseudo erasable identifier TEFLG and the editable identifier NFLG has limitation, and when the user changes the pseudo erasable identifier TEFLG to the editable

identifier NFLG, the user has to use a specific program stored in the memory 8a in the central control circuit 8 for making the change.

【0056】

The completely erasable identifier CEFLG is provided for substantially erasing the desired video object (VOB) or title from the DVD-RW2. In other words, if the user changes the editable identifier NFLG or pseudo erasable identifier TEFLG attached to the video object (VOB) or title with the completely erasable identifier CEFLG, the pertinent video object (VOB) or title remains in the DVD-RW2, however, allows to be overwritten or the like by a new title or the like, thus an effect materially the same as the erasure is produced. Furthermore, when a new title is recorded, an actually corresponding video object (VOB) can be erased as an area where recording is possible, for making an area which can be used for recording the new title.

【0057】

Now described is an example of operation of a case where the recording information is recorded and edited by the recording and reproducing apparatus 1 by use of the DVD-RW2 having such logical data structure.

【0058】

At first, an example of operation of a case where the recording information is recorded is described. In Fig. 1, when recording, for example, of television broadcasting or the like is commenced, the audio signal S_{AI} and video signal S_{VI} of the television broadcasting or the like are processed by A/D converters 11 and 12, audio compress circuit 13, and video compress circuit 14, converted to a compressed audio data D_{AI} and compressed video data D_{VI}, and supplied to the multiplexer 15. Then, the compressed audio data D_{AI} and compressed video data D_{VI} are time-division multiplexed by the multiplexer 15, encoded by the encoder 17, and picture-recorded (recorded) in

the DVD-RW2 via the recording circuit 18 and the pickup 4 together with the navigation data relative to respective attributes and the like.

【0059】

Here, when the above-described television broadcasting or the like is recorded in the DVD-RW2 as a title, the title is allocated of the editable identifier NFLG, and further the video objects (VOB) comprising the title are also allocated with the editable identifiers NFLG, and managed by the user title identifier table UST and video object identifier table (VOBT), respectively, as shown in Fig. 6.

【0060】

Now, an example of operation of the recording and reproducing apparatus 1 of a case where the user edits the titles thus recorded is described with reference to a flowchart shown in Fig. 8.

【0061】

In Fig. 8, when the user turns on power of the recording and reproducing apparatus 1 and the DVD-RW2 is inserted (step 100), a flow shifts to process in step 102. In step 102, the video manager information (VMGI) recorded in the DVD-RW2 is read by the pickup 4 and supplied to the reproducing system 7. In the reproducing system 7, the video manager information (VMGI) is inputted through the reproducing circuit 26 and decoder 25, and stored in the reproducing buffer memory 24. There, the video manager information (VMGI) waits until the user issues a predetermined instruction (steps 104 and 106).

【0062】

In step 104, when the user designates a desired title which is an editing target, or a desired video object (VOB) composing the title, an attribute of the designated title or video object (VOB) is displayed on the display 10.

【0063】

Then, in step 106, when the user instructs to change the identifier FLG presently attached to the desired title or the video object (VOB) which is the editing target to another identifier, the flow shifts to a process of step 108.

【0064】

In step 108, the central control circuit 8 accesses to the reproducing buffer memory 24, and inputs the program chain information (PGCI) and data Cmr of the identifier FLG out of the video manager information (VMGI). Further, the central control circuit 8 confirms the identifier FLG attached to the designated title or video object (VOB) based on the program chain information (PGCI) and identifier FLG.

【0065】

Then, in step 110, determination is made whether or not a new identifier FLG designated by the user satisfies the relationship shown in Fig. 7. For example, when the present identifier FLG is a pseudo erasable identifier TEFLG, and the instruction is to change it to an editable identifier NFLG, determination is made that the pseudo erasable identifier TEFLG cannot be changed to the editable identifier NFLG. Namely, the determination is "No." Further, when the present identifier FLG is an editable identifier NFLG, and an instruction is to change it to a protective identifier PFLG, determination is made that the editable identifier NFLG can be changed to the protective identifier PFLG. Namely, the determination is "Yes."

【0066】

When the determination is "No," the flow shifts to step 116 for displaying at the display 10 a display that there is an error in the instruction for the change of the identifier FLG, for example, a warning display reading " OOO identifier cannot be changed to XXX identifier" or the like, and the process is terminated.

【0067】

On the other hand, when the determination is "Yes" in step 110, the flow shifts to step 112, and the final confirmation whether the change of the identifier FLG may be commenced is made by displaying on the display 10. In response to the display, the user instructs to commence the change, then data of the new identifier FLG is supplied from the central control circuit to the multiplexer 15, for rewriting through the recording system 6 and the pickup 4 the pertinent present identifier FLG in the user title identifier table (UST) or in the video object identifier table (VOBT) shown in Fig. 6 to the new identifier FLG .

【0068】

Then, in step 114, in a case that a title stream has to be changed on account of rewriting of the identifier FLG, management data such as the program chain information (PGCI) or the like indicating the reproducing order of the video object (VOB) belonging to the title is changed to a proper state.

【0069】

For example, in a case that the identifiers FLG of the video object VOB (#2) in the midway, out of a plurality of video objects VOB (#1) to VOB (#4) belonging to the title (#1) shown in Fig. 6, is changed to the completely erasable identifier CEFLG, the remaining video objects VOB (#1), VOB (#3), and VOB (#4) are changed to a set of the title (#1), and the program chain information (PGCI) or the like is rewritten so as not to generate inconsistency in the reproducing order.

【0070】

Further, when the instruction to change is not issued about the identifiers FLG of the title (#1), and the identifiers FLG of the video objects VOB (#1) to VOB (#4) comprising the title (#1) are changed to identifiers FLG different from the identifiers FLG of the title (#1), the identifiers FLG of the

title (#1) are changed to the same identifiers FLG as the identifiers of the video objects VOB (#1) to VOB (#4). For example, when the identifiers of the title (#1) remain to be the editable identifiers NFLG, and identifiers of the video objects VOB (#1) to VOB (#4) are changed from the editable identifiers NFLG to the protective identifiers PFLG, the identifiers FLG of the title (#1) are compulsorily changed to the protective identifiers PFLG.

【0071】

Then, when the optimizing process accompanying the change of the identifiers FLG is completed, the flow shifts to step 116 for displaying a display of completion of the changing process of the identifiers FLG and of video manager information (VMGI) after the updating, and the process is terminated.

【0072】

According to the present embodiment, since management conditions of the titles and video objects (VOB) created by the user are set by a variety of identifiers FLG, by use of these identifiers FLG, the user can freely manage the titles and video objects (VOB) as well as can use them also in editing the titles in a variety of modes.

【0073】

In particular, since the identifier FLG can be changed in a video object (VOB) unit, a versatility of editing is made possible.

【0074】

It should be noted that although the DVR-RW is described in the present embodiment, the present invention is not limited to the recording medium. For example, a body of a video object (VOB) or the like cannot be physically erased, but can also be applied to a DVD-R which is capable of recording additional recording information.

【0075】

【Advantage of the Invention】

As described above, a recording medium according to the present invention comprises a first recording area for recording information of recording as a set of one or two or more predetermined recording units, and a second recording area for recording controlling information for controlling the recording information recorded in the first recording area, and is provided with a logical data structure for recording identifying information for identifying a management condition of the recording information recorded in the first recording area by a recording unit in the above-described second recording area, thus by making the identifying information as identifying information for erasure, protection, or the like, and by allocating these identifying information to each of the predetermined recording units for management, the recording information can be edited and managed in a variety of modes.

【0076】

Furthermore, a recording and reproducing apparatus according to the present invention is a recording apparatus for recording information of recording in a recording medium comprising a first recording area for recording the recording information as a set of one or two or more predetermined recording units and a second recording area for recording controlling information for controlling the recording information recorded in the first recording area, and is provided with a controlling means for recording identifying information for identifying a management condition of the recording information recorded in the first recording area by a recording unit in the second recording area, thus by making the identifying information as identifying information for erasure, protection, or the like, and by allocating the identifying information to each of predetermined recording units for management, the recording information can be edited

and managed in a variety of modes.

【Brief Description of the Drawings】

【Fig. 1】

Fig. 1 is a block diagram showing a construction of a recording and reproducing apparatus according to the present embodiment.

【Fig. 2】

Fig. 2 is a schematic explanatory diagram showing a logical data structure of a recording medium of the present embodiment.

【Fig. 3】

Fig. 3 is a schematic explanatory diagram showing a construction of a video pack.

【Fig. 4】

Fig. 4 is a schematic explanatory diagram showing a construction of an audio pack.

【Fig. 5】

Fig. 5 is a schematic explanatory diagram showing a construction of video manager information.

【Fig. 6】

Fig. 6 is a schematic explanatory diagram showing a construction of a user title identifier table and video object identifier table.

【Fig. 7】

Fig. 7 is an explanatory diagram for describing a function of an identifier.

【Fig. 8】

Fig. 8 is a flowchart for describing an operation example of an identifier changing process in a recording and reproducing apparatus according to the present embodiment.

【Explanation of Codes】

1 recording and reproducing apparatus

2 DVD-RW

6 recording system
7 reproducing system
8 central control circuit
11, 12 A/D converter
13 audio compress circuit
14 video compress circuit
15 multiplexer
16 recording buffer memory
17 encoder
18 recording circuit
19, 20 A/D converter
21 video decompress circuit
22 audio decompress circuit
23 demultiplexer
24 reproducing buffer memory
25 decoder
26 reproducing circuit

【Name of Document】 ABSTRACT

【Abstract】

【Object】 To facilitate to manage recording information recorded in a recording medium

【Solving Means】 Recording information is made as a set of one or a plurality of first recording units VOB (#1) to VOB (#i), and a plurality of second recording units comprising an arbitrary combination of the first recording units VOB (#1) to VOB (#i) are made titles (#1) to (#k), identifying information FLG having a different meaning of erasure, preservation, editable, or the like is selectively allocated to each of the first and the second recording units, the identifying information FLG allocated to the first recording units is batch managed by a first table (VOBT), and the identifying information FLG allocated to the second recording units is batch managed by a second table (UST), thus each of the first and the second recording units is processed under a management condition indicated by respective identifying information FLG. Furthermore, the present identifying information FLG allocated to each of the first and the second recording units can also be changed to other identifying information FLG having a different meaning.

【Selected Drawing】 FIG. 6

FIG.1

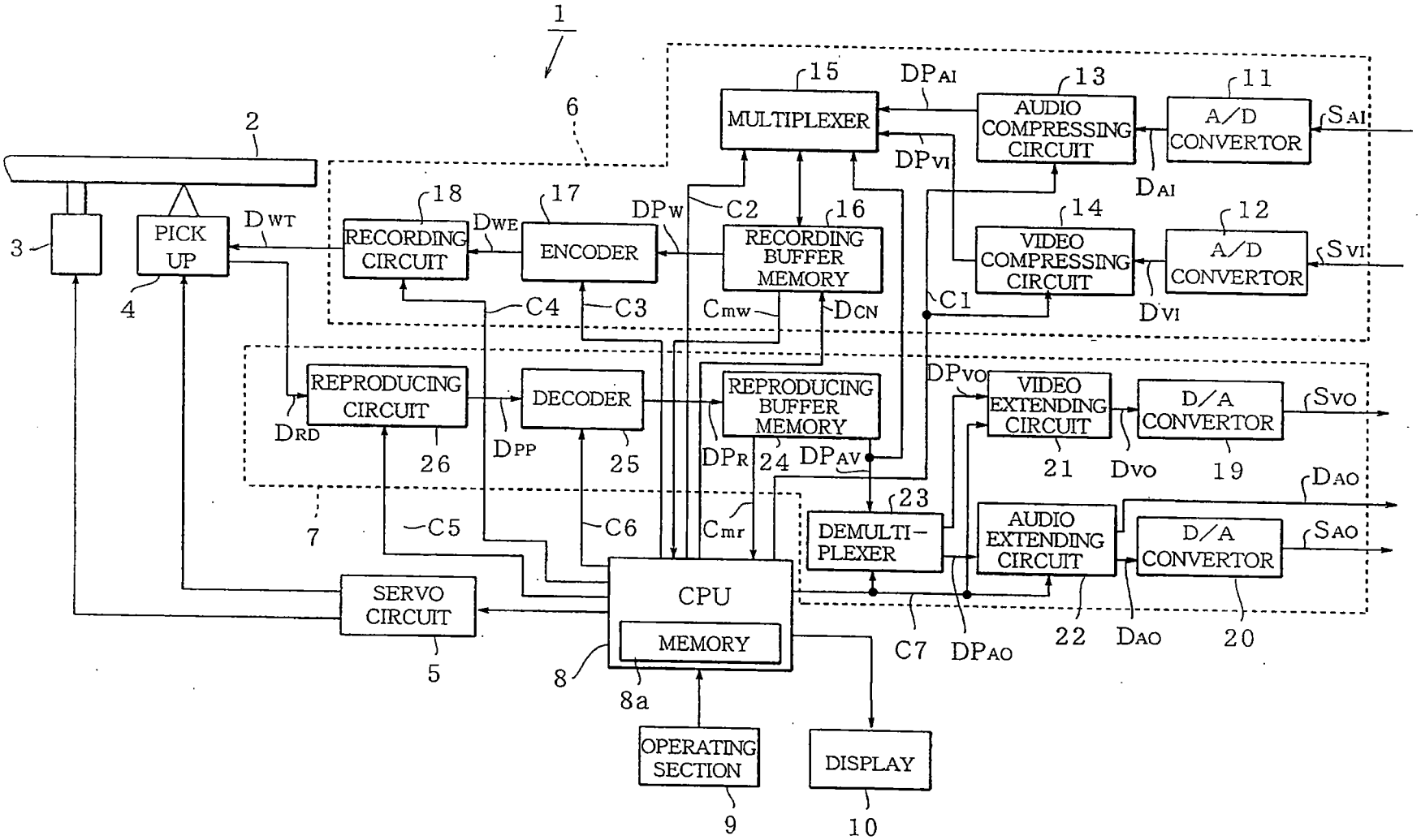

1
2
3
4
5
6
7
8
8a
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
PICK UP
SERVO CIRCUIT
RECORDING CIRCUIT
ENCODER
REPRODUCING CIRCUIT
DECODER
MULTIPLEXER
RECORDING BUFFER MEMORY
REPRODUCING BUFFER MEMORY
DEMULTI-PLEXER
A/D CONVERTOR
A/D CONVERTOR
AUDIO COMPRESSING CIRCUIT
VIDEO COMPRESSING CIRCUIT
VIDEO EXTENDING CIRCUIT
AUDIO EXTENDING CIRCUIT
D/A CONVERTOR
D/A CONVERTOR
CPU
MEMORY
OPERATING SECTION
DISPLAY
DWT
DWE
DRD
DPP
DPW
DPR
DPAV
DPAI
DPVI
DPVO
DPAO
DAI
DVI
DVO
DAO
DCN
Cmw
Cmr
C1
C2
C3
C4
C5
C6
C7
SAI
SVI
SVO
SAO

FIG.2

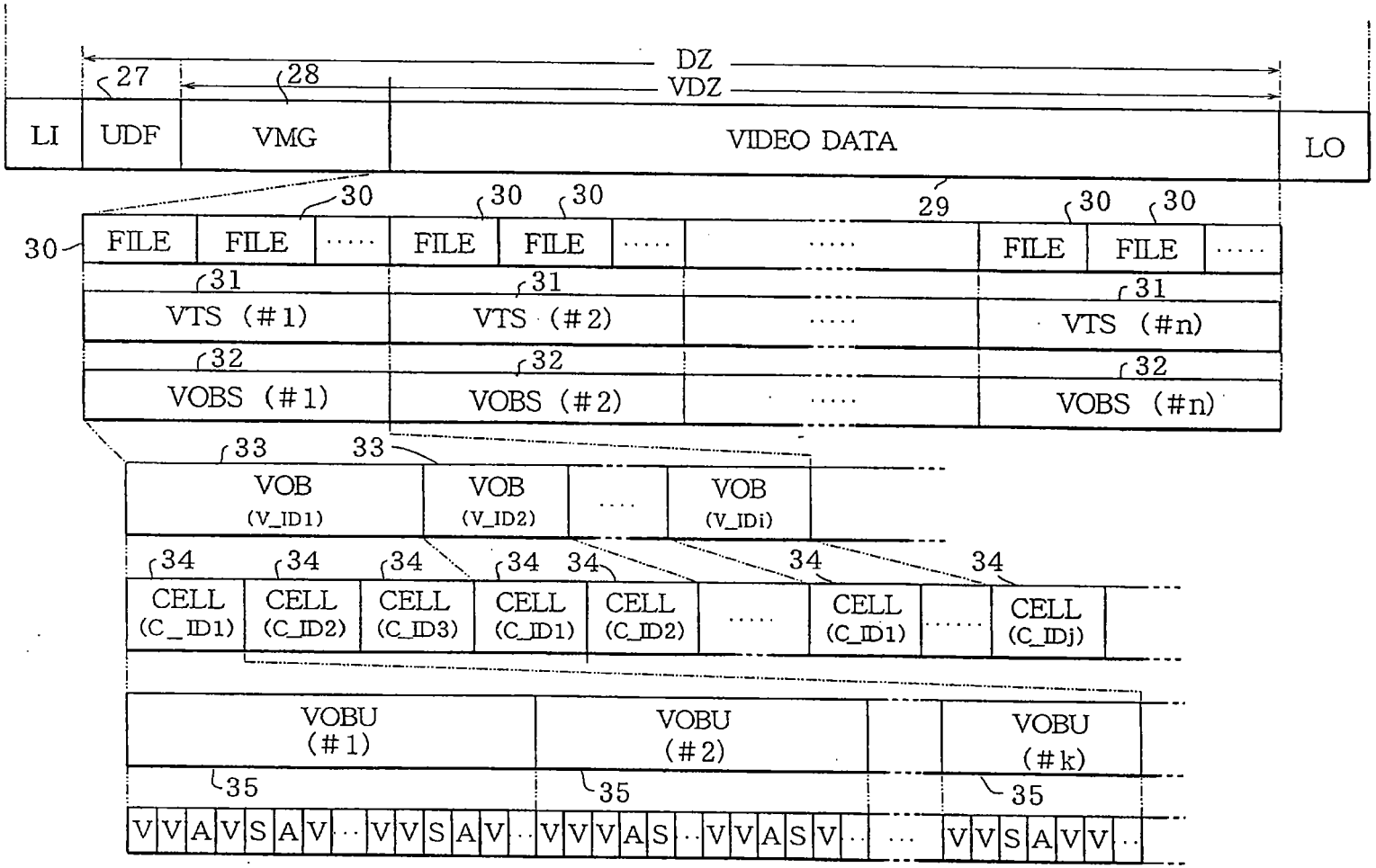

DZ
VDZ
27
28
LI
UDF
VMG
VIDEO DATA
LO
30
29
FILE
VTS (#1)
VTS (#2)
VTS (#n)
31
32
VOBS (#1)
VOBS (#2)
VOBS (#n)
33
VOB (V_ID1)
VOB (V_ID2)
VOB (V_IDi)
34
CELL (C_ID1)
CELL (C_ID2)
CELL (C_ID3)
CELL (C_ID1)
CELL (C_ID2)
CELL (C_ID1)
CELL (C_IDj)
VOBU (#1)
VOBU (#2)
VOBU (#k)
35

FIG.3

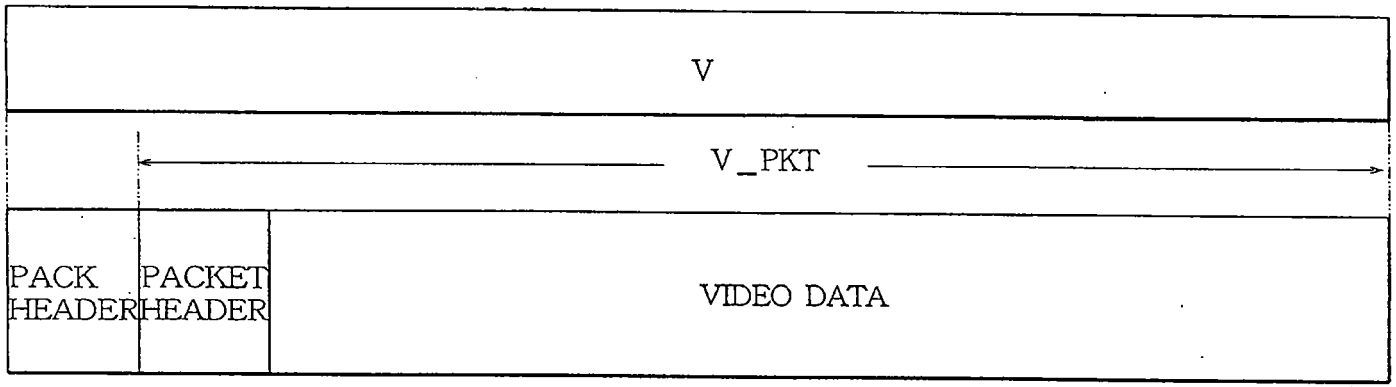
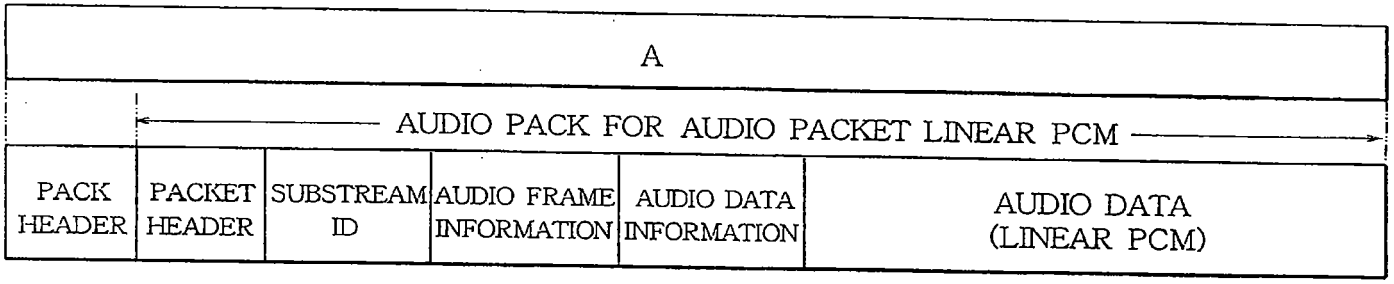
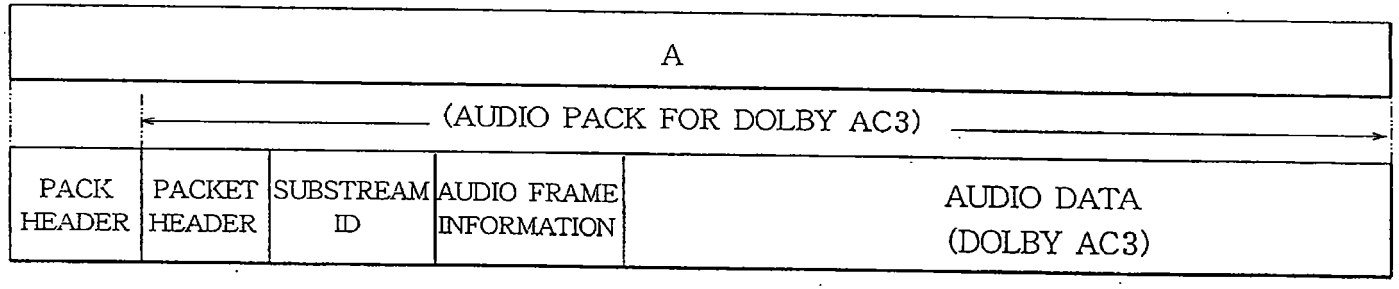


FIG.4(a)


A
AUDIO PACK FOR AUDIO PACKET LINEAR PCM
PACK HEADER
PACKET HEADER
SUBSTREAM ID
AUDIO FRAME INFORMATION
AUDIO DATA INFORMATION
AUDIO DATA (LINEAR PCM)

(b)


A
(AUDIO PACK FOR DOLBY AC3)
PACK HEADER
PACKET HEADER
SUBSTREAM ID
AUDIO FRAME INFORMATION
AUDIO DATA (DOLBY AC3)

(c)

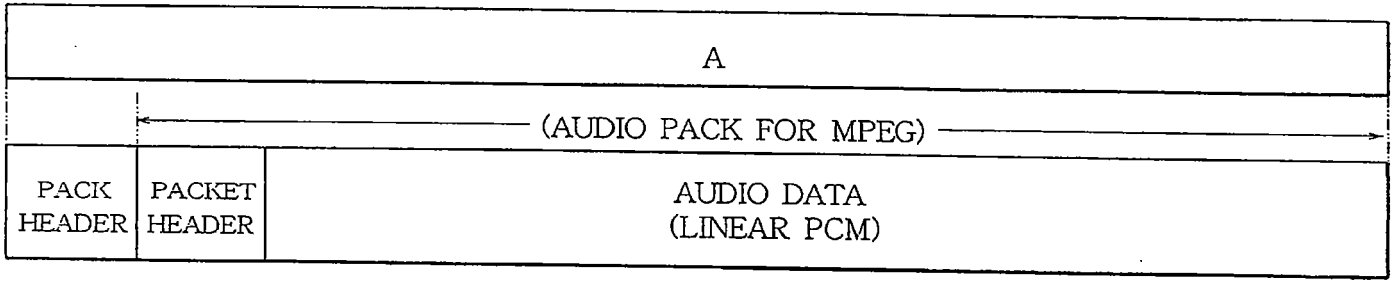

A
(AUDIO PACK FOR MPEG)
PACK HEADER
PACKET HEADER
AUDIO DATA (LINEAR PCM)

FIG.5

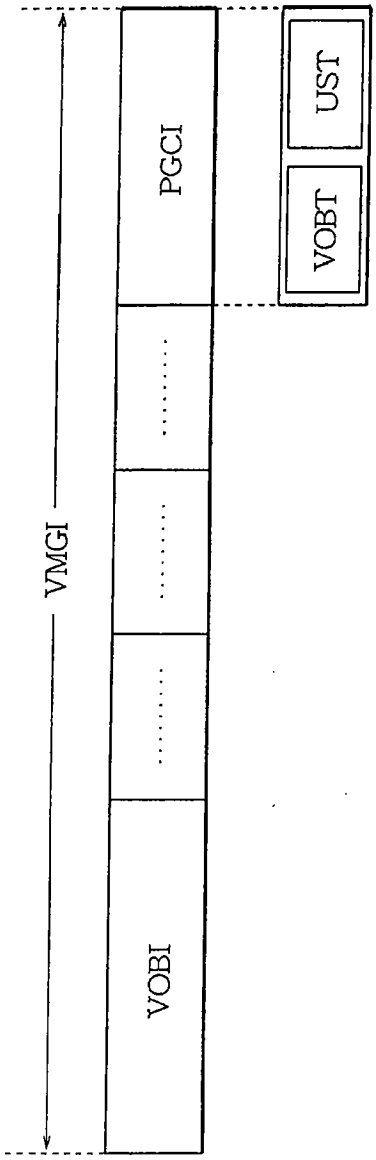


FIG.6

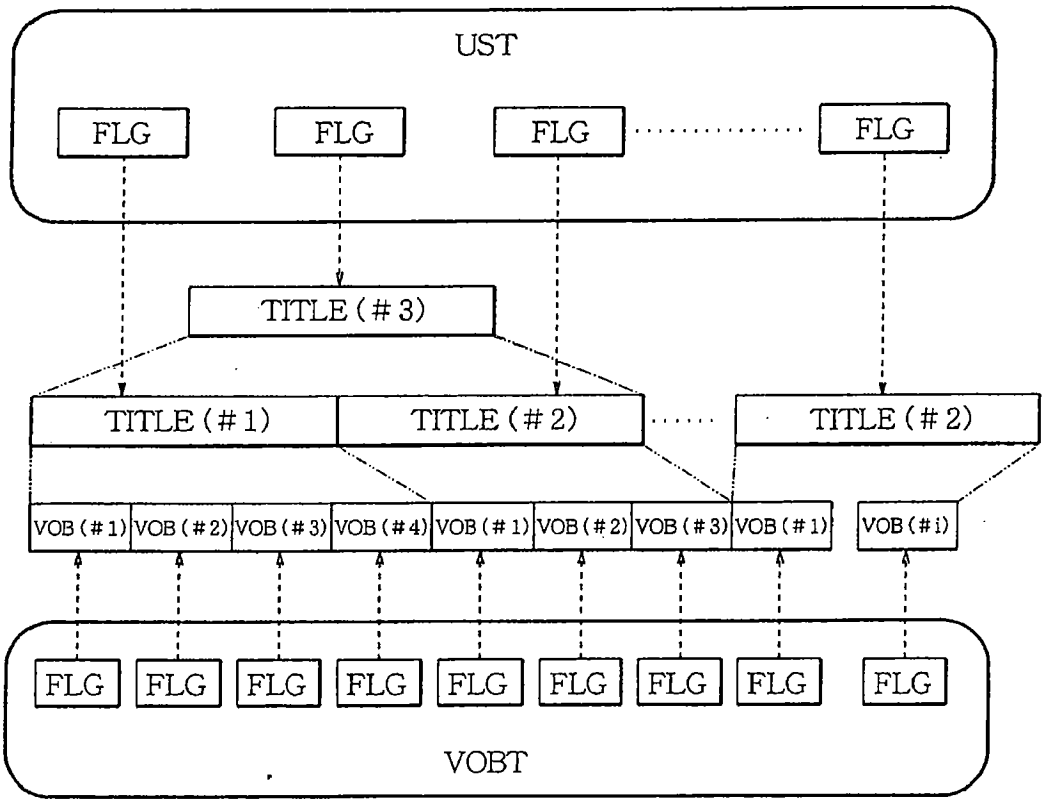

UST
FLG
FLG
FLG
FLG
TITLE (#3)
TITLE (#1)
TITLE (#2)
TITLE (#2)
VOB (#1)
VOB (#2)
VOB (#3)
VOB (#4)
VOB (#1)
VOB (#2)
VOB (#3)
VOB (#1)
VOB (#i)
FLG
FLG
FLG
FLG
FLG
FLG
FLG
FLG
FLG
VOBT

FIG.7

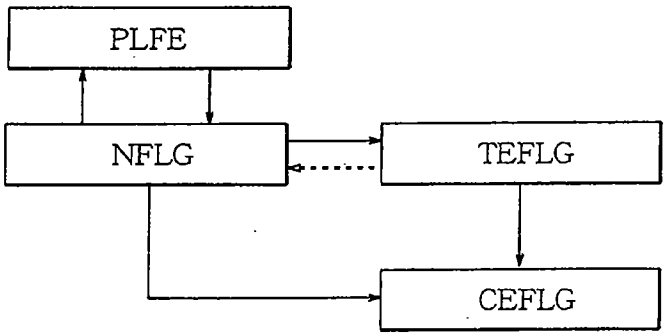
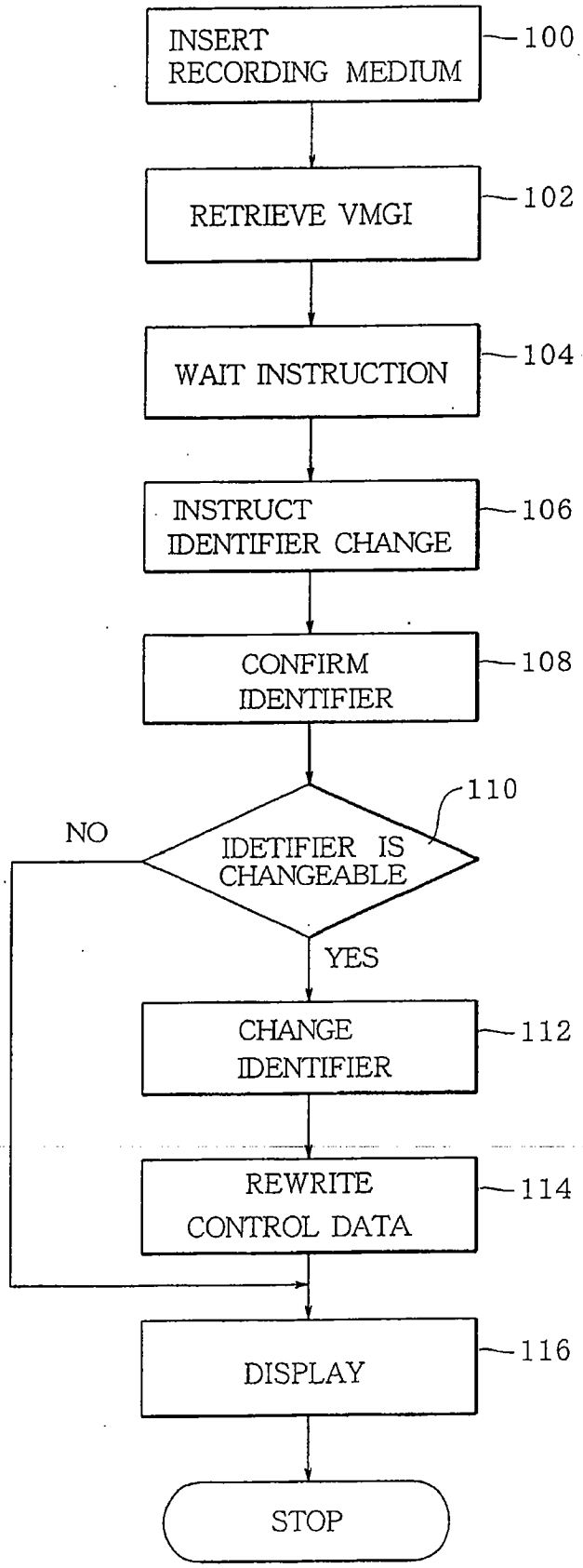


FIG.8


INSERT RECORDING MEDIUM
100
RETRIEVE VMGI
102
WAIT INSTRUCTION
104
INSTRUCT IDENTIFIER CHANGE
106
CONFIRM IDENTIFIER
108
IDETIFIER IS CHANGEABLE
110
NO
YES
CHANGE IDENTIFIER
112
REWRITE CONTROL DATA
114
DISPLAY
116
STOP